Ex-proof pressure relief valves
pilot operated, subplate or in line mounting - ATEX, IECEx, EAC or cULus

AGAM, ARAM
Ex-proof pressure relief valves equipped with solenoid pilot valve for venting or multiple pressure selection, certified for safe operation in hazardous environments with potentially explosive atmosphere.
Certifications:
- Multicertification ATEX, IECEx and EAC for gas group II 2G and dust category II 2D
- Multicertification ATEX and IECEx for gas group I M2 (mining)
- cULus North American certification for gas group C&D

The flameproof enclosure of solenoid prevents the propagation of accidental internal sparks or fire to the external environment. The solenoid is also designed to limit the surface temperature within the classified limits.

AGAM: pressure relief, subplate mounting
Size: 10, 20, 32 - ISO 6264
Max flow: 200, 400, 600 l/min

ARAM: pressure relief, threaded connections
Size: 20 and 32 - G 3/4" and G 1 1/4"
Max flow: 350 and 500 l/min
Max pressure: 350 bar

---

### 1 MODEL CODE

<table>
<thead>
<tr>
<th>AGAM</th>
<th>20</th>
<th>20/100/100</th>
<th>M</th>
<th>AO</th>
<th>24DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-proof pressure relief valves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGAM subplate mounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARAM threaded connections</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Valve size:**
- 10 = AGAM (ISO 6264)
- 20 = AGAM (ISO 6264)
- 32 = AGAM (ISO 6264)
- 20 = ARAM G 3/4"
- 32 = ARAM G 1 1/4"

**Configuration, see section 7:**
- 10 20 22
- 11 21 32

**Max regulated pressure**
of first (second / third) setting, see section 7:
- 50 = 50 bar
- 100 = 100 bar
- 210 = 210 bar
- 350 = 350 bar

**Seals material, see section 6:**
- = NBR
- PE = FKM
- BT = HNBR (1)

**Voltage code, see section 5:**
- E = external pilot
- O = horizontal cable entrance (1)
- V = regulating handwheel for pressure adjustment
- WP = manual override protected by metallic cap
- Y = external drain

**Series number**

**Certification type:**
- AO = Multicertification for Group II 2G / II 2D (2)
- AO/M = Multicertification for Group I M2 (mining)
- AO/UL = cULus North American certification

**Solenoid threaded connection for cable gland fitting:**
- GK = GK-1/2" - not for cULus
- M = M20x1,5 - not for cULus
- NPT = 1/2" NPT

---

(1) Not for multicertification M group I (mining)
(2) The valves with Multicertification for Group II are also certified for Indian market according to PESO (Petroleum and Explosives Safety Organization).
(3) For possible combined options, see 11.1

⚠️ The pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar
### 2 CONFIGURATIONS AND HYDRAULIC SYMBOLS

- **AGAM-**/*10 A **ARAM-**/*10
  - one setting pressure + venting with de-energized solenoid

- **AGAM-**/*20 A **ARAM-**/*20
  - two setting pressure + venting with de-energized solenoid

- **AGAM-**/*21 A **ARAM-**/*21
  - two setting pressure + venting with energized solenoid

- **AGAM-**/*22 A **ARAM-**/*22
  - three setting pressure without venting

### 3 GENERAL CHARACTERISTICS

- **Assembly position / location:** Any position
- **Subplate surface finishing:** Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)
- **MTTFd values according to EN ISO 13849:** 75 years, for further details see technical table P007
- **Ambient temperature:**
  - **Standard** = -20°C ÷ +70°C /PE option = -20°C ÷ +70°C /BT option = -40°C ÷ +70°C
- **Storage temperature range:**
  - **Standard** = -20°C ÷ +60°C /PE option = -20°C ÷ +80°C /BT option = -40°C ÷ +70°C
- **Surface protection:** Zinc coating with black passivation (body and solenoid housing)
- **Compliance:** Explosion proof protection, see section 7

### 4 HYDRAULIC CHARACTERISTICS

<table>
<thead>
<tr>
<th>Valve size</th>
<th>10</th>
<th>20</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max operating pressure [bar]</td>
<td>P = 350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max regulated pressure [bar]</td>
<td>50</td>
<td>100</td>
<td>210</td>
</tr>
<tr>
<td>Pressure range [bar]</td>
<td>6÷100; 7÷210; 6÷350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max flow AGAM (1) [l/min]</td>
<td>200</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>Max flow ARAM (1) [l/min]</td>
<td>-</td>
<td>350</td>
<td>500</td>
</tr>
</tbody>
</table>

(1) see Q/Δp diagrams at section 12 and 13

### 5 ELECTRICAL CHARACTERISTICS

- **Valve type:**
  - AGAM-*AO
  - ARAM-*AO/M
  - AGAM-*AO/UL
  - ARAM-*AO/UL
- **Voltage code (1):**
  - **VDC ±10%**
  - **VAC 50/60 Hz ±10%**
  - 12DC, 24DC, 28DC, 48DC, 110DC, 125DC, 220DC
  - 12AC, 24AC, 110AC, 230AC
- **Power consumption at 20°C:**
  - 8W
  - 12W
- **Coil insulation:** class H
- **Protection degree with relevant cable gland:** IP66/67 to DIN EN60529
- **Duty factor:** 100%

(1) For alternating current supply a rectifier bridge is provided built-in the solenoid

For power supply frequency 60 Hz, the nominal supply voltage of solenoids 110AC and 230AC must be 115/60 and 240/60 respectively

### 6 SEALS AND HYDRAULIC FLUIDS

- **Seals, recommended fluid temperature:**
  - **NBR seals** (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C
  - **FKM seals** (PE option) = -20°C ÷ +80°C
  - **HBNBR seals** (BT option) = -40°C ÷ +60°C, with HFC hydraulic fluids = -40°C ÷ +50°C
- **Recommended viscosity:** 15÷100 mm²/s - max allowed range 2.8 ÷ 500 mm²/s
- **Max fluid contamination level:** ISO4406 class 20/18/15 - NAS1638 class 9, see also filter section at www.atos.com or KTF catalog

#### Hydraulic fluid

<table>
<thead>
<tr>
<th>Classification</th>
<th>Ref. Standard</th>
<th>Suitable seals type</th>
<th>Mineral oils</th>
<th>Flame resistant without water</th>
<th>Flame resistant with water</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBR, FKM, HNBR</td>
<td>DIN 51524</td>
<td>HL, HLP, HLPD, HVLP, HVLPD</td>
<td>DIN 51524</td>
<td>DIN 51524</td>
<td>DIN 51524</td>
</tr>
<tr>
<td>FKM, HFDU, HFDU</td>
<td>ISO 12922</td>
<td>NBR, HNBR</td>
<td>ISO 12922</td>
<td>ISO 12922</td>
<td>ISO 12922</td>
</tr>
</tbody>
</table>

⚠️ The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

(1) Performance limitations in case of flame resistant fluids with water:
- max operating pressure = 210 bar
- max fluid temperature = 50°C
7 CERTIFICATION DATA

Valve type | AGAM-*AA | ARAM-*AA | AGAM-*AA| | ARAM-*AA|
---|---|---|---|---|
Certifications | Multicertification Group II | Multicertification Group I | North American cULus |
Solenoid certified code | OA | OA/M | OA/EC |
Type examination certificate (1) | ATEX: CESI 02 ATEX 014 | ATEX: CESI 03 ATEX 057x | 20170324 - E366100 |
Method of protection | • ATEX 2014/34/EU | • ATEX 2014/34/EU | • UL 1203 |
| Ex II 2G Ex d IIC T6/T4/T3 Gb | Ex I M2 Ex db I Mb | Class I, Div I, Groups C & D |
| Ex II 2D Ex tb IIIC T85°C/T200°C Db | • IECEx Ex d IIC T6/T4/T3 Gb | Class I, Zone I, Groups II A & II B |
| • IECEx Ex d IIC T6/T4/T3 Gb | Ex db I Mb | |
| Ex tb IIIC T85°C/T120°C Db | • EAC Ex II 2G Ex d IIC T6/T4 |
| • EAC Ex II 2G Ex d IIC T6/T4 |
Temperature class | T6 | T4 | - | T6 | T5 |
Surface temperature | ≤ 85 °C | ≤ 135 °C | ≤ 150 °C | ≤ 85 °C | ≤ 100 °C |
Ambient temperature (2) | -40 °C ≤ +45 °C | -40 °C ≤ +70 °C | -20 °C ≤ +70 °C | -40 °C ≤ +55 °C | -40 °C ≤ +70 °C |
| EN 60079-31:2014 | IEC 60079-31:2013 | CSA 22.2 n°139-13 |
Cable entrance: threaded connection (vertical (standard) or horizontal (option /O)) | GK = GK-1/2" |
| M = M20x1.5 |
| NPT = 1/2" NPT |
| 1/2" NPT ANSI/ASME B46.1 |

(1) The type examiner certificates can be downloaded from www.atos.com
(2) The solenoids Group II and cULus are certified for minimum ambient temperature -40°C
In case the complete valve must withstand with minimum ambient temperature of -40°C, select /BT in the model code

WARNING: service work performed on the valve by the end users or not qualified personnel invalidates the certification

8 EX PROOF SOLENOIDS WIRING

Multicertification

| 1 = Coil |
| 2 = GND |
| 3 = Coil |

PCB 3 poles terminal board suitable for wires cross sections up to 2.5 mm² (max AWG14)

EX PROOF SOLENOIDS WIRING

| 1 = Coil |
| 2 = GND |
| 3 = Coil |

alternative GND screw terminal connected to solenoid housing

Pay attention to coil polarity

1 = Coil |
PCB 3 poles terminal board suggested cable section up to 1.5 mm² (max AWG16), see section 8 note 1

1 = Coil |
PCB 3 poles terminal board suggested cable section up to 1.5 mm² (max AWG16), see section 8 note 1
9  CABLE SPECIFICATION AND TEMPERATURE - Power supply and grounding cables have to comply with following characteristics:

| Multicertification Group I and Group II | Power supply: section of coil connection wires = 2,5 mm² | Grounding: section of internal ground wire = 2,5 mm²  
section of external ground wire = 4 mm² |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>cULus certification:</td>
<td></td>
</tr>
<tr>
<td>• Suitable for use in Class I Division 1, Gas Groups C</td>
<td></td>
</tr>
<tr>
<td>• Armored Marine Shipboard Cable which meets UL 1309</td>
<td></td>
</tr>
<tr>
<td>• Tinned Stranded Copper Conductors</td>
<td></td>
</tr>
<tr>
<td>• Bronze braided armor</td>
<td></td>
</tr>
<tr>
<td>• Overall impervious sheath over the armor</td>
<td></td>
</tr>
</tbody>
</table>

Any Listed (UBV2Z/UBVZ7) Marine Shipboard Cable rated 300 V min, 15A min. 3C 2,5 mm² (14 AWG) having a suitable service temperature range of at least -25°C to +110°C ("BT") Models require a temperature range from -40°C to +110°C

**Note 1:** For Class I wiring the 3C 1,5 mm² AWG 16 cable size is admitted only if a fuse lower than 10 A is connected to the load side of the solenoid wiring.

9.1 Cable temperature
The cable must be suitable for the working temperature as specified in the “safety instructions” delivered with the first supply of the products.

Multicertification:

<table>
<thead>
<tr>
<th>Max ambient temperature [°C]</th>
<th>Temperature class</th>
<th>Max surface temperature [°C]</th>
<th>Min cable temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>45 °C</td>
<td>Group I</td>
<td>150 °C</td>
<td>not prescribed</td>
</tr>
<tr>
<td>55 °C</td>
<td>Group II</td>
<td>85 °C</td>
<td></td>
</tr>
<tr>
<td>70 °C</td>
<td></td>
<td>150 °C</td>
<td>90 °C</td>
</tr>
<tr>
<td>90 °C</td>
<td></td>
<td>135 °C</td>
<td></td>
</tr>
</tbody>
</table>

9.2 cULus certification:

<table>
<thead>
<tr>
<th>Max ambient temperature [°C]</th>
<th>Temperature class</th>
<th>Max surface temperature [°C]</th>
<th>Min cable temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>55 °C</td>
<td>T6</td>
<td>85 °C</td>
<td>100 °C</td>
</tr>
<tr>
<td>70 °C</td>
<td>T5</td>
<td>100 °C</td>
<td>100 °C</td>
</tr>
</tbody>
</table>

10 CABLE GLANDS only for Multicertification
Cable glands with threaded connections GK-1/2", 1/2"NPT or M20x1,5 for standard or armoured cables have to be ordered separately, see tech. table KX600

**Note:** a Loctite sealant type 545, should be used on the cable gland entry threads

11 OPTIONS

**E** = External pilot option to be selected when the pilot pressure is supplied from a different line respect to the P main line.
With option E the internal connection between port P and X of the valve is plugged.
The pilot pressure must be connected to the X port available on the valve’s mounting surface or on main body (threaded pipe connection G ¼”).

**O** = Horizontal cable entrance, to be selected in case of limited vertical space

**V** = Regulating handweel for pressure adjustment

**WP** = Manual override protect by metallic cap

**Y** = The external drain is mandatory in case the main line T is subjected to pressure peaks or it is pressurized.
The Y drain port has a threaded connection G ¼” available on the pilot stage body.

11.1 Possible combined options:

/EO, /EV, /EY, /EW, /EWP, /EOV, /EYO, /EYV
/EOWP, /EWPY, /EOYV, /EOVWP, /EVPY, /EOVWPY
/OV, /OY, /OWP, /OVY, /OVWP, /OWPY, /OVWY,
/NY, /NWP, /NWPY
/WPY

---

Blinded plug SP-X100A

---

Y option
**Regulated Pressure Versus Flow Diagrams** based on mineral oil ISO VG 46 at 50°C

**Minimum Pressure Versus Flow Diagrams** based on mineral oil ISO VG 46 at 50°C
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-06-09-1-97
Fastening bolts:
4 socket head screws M12x35 class 12.9
Tightening torque = 125 Nm
Seals: 2 OR 123, 1 OR 109/70
Ports P, T: Ø = 14.5 mm
Ports X: Ø = 3.2 mm

Valve’s bottom view

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>AGAM-10/10/10/11/21/22/32</th>
<th>AGAM-10/10/11/21/22/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGAM-10/10/10/11/21/22/32</td>
<td>6.45</td>
<td>7.55</td>
</tr>
<tr>
<td>AGAM-10/10/10/11/21/22/32</td>
<td>7.25</td>
<td>3</td>
</tr>
<tr>
<td>option /V</td>
<td>+0.35</td>
<td></td>
</tr>
<tr>
<td>option /O</td>
<td>+0.25</td>
<td></td>
</tr>
<tr>
<td>option /WP</td>
<td>+0.25</td>
<td></td>
</tr>
</tbody>
</table>

Option /V
Option /O
Option /WP
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-08-11-1-97

Fastening bolts:
- 4 socket head screws M16x50 class 12.9
- Tightening torque = 300 Nm
- Seals: 2 OR 4112; 1 OR 109/70
- Ports P, T: Ø = 24 mm
- Ports X: Ø = 3.2 mm

Mass [kg]

<table>
<thead>
<tr>
<th>Option</th>
<th>Mass [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>/V</td>
<td>7.65</td>
</tr>
<tr>
<td>/O</td>
<td>8.75</td>
</tr>
<tr>
<td>/WP</td>
<td>8.45</td>
</tr>
<tr>
<td>+0.35</td>
<td>10.2</td>
</tr>
<tr>
<td>+0.25</td>
<td></td>
</tr>
</tbody>
</table>

Valve's bottom view
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-10-17-1-97
(with M20 fixing holes instead of standard M18)
Fastening bolts:
4 socket head screws M20x60 class 12.9
Tightening torque = 600 Nm
Seals: 2 OR 4131; 1 OR 109/70
Ports P, T: Ø = 28.5 mm
Ports X: Ø = 3.2 mm

X = port connection for external pilot
Y = port connection for external drain

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>AGAM-32/10</th>
<th>AGAM-32/20</th>
<th>AGAM-32/22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option /V</td>
<td>9.05</td>
<td>10.05</td>
<td>9.85</td>
</tr>
<tr>
<td>Option /O</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option /WP</td>
<td></td>
<td></td>
<td>+0.35</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>11.6</td>
<td>+0.25</td>
</tr>
</tbody>
</table>

Valve’s bottom view
**ARAM-20**

- **X** = port connection for external pilot
- **Y** = port connection for external drain

**Mass [kg]**

<table>
<thead>
<tr>
<th>Model</th>
<th>Mass [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARAM-20/10</td>
<td>6.75</td>
</tr>
<tr>
<td>ARAM-20/11</td>
<td></td>
</tr>
<tr>
<td>ARAM-20/20</td>
<td>8.45</td>
</tr>
<tr>
<td>ARAM-20/21</td>
<td></td>
</tr>
<tr>
<td>ARAM-20/22</td>
<td>8.15</td>
</tr>
<tr>
<td>ARAM-20/32</td>
<td>10.1</td>
</tr>
<tr>
<td>Option /V</td>
<td></td>
</tr>
<tr>
<td>Option /O</td>
<td>+0.35</td>
</tr>
<tr>
<td>Option /WP</td>
<td>+0.25</td>
</tr>
</tbody>
</table>

**Option /V**

**Option /O**

**Option /WP**